AUSTRALIAN PLANT DISEASE RECORDER

Volume 12, Number 4 October, 1960

Edited by

P.G. Valder, Biology Branch,

Department of Agriculture,

Box 36, P.O.,

Sydney.

CONTENTS

PLANT DISEASE NOTES	Page
Cereals and grasses	35
Field Crops	39
Vegetables	40
Fruit	41
Ornamentals	44

For confidential circulation to plant pathologists in Australia.

PLEASE DO NOT ABSTRACT

COMMONWEALTH MYCOLOGICAL INSTITUTE
5 JUN 1961

RECENT CHANGES IN THE RACES OF WHEAT STEM RUST IN WESTERN AUSTRALIA:

From about 1928 to 1958 only one race of wheat stem rust was identified from Western Australia, namely R.126-1 (- R.34) which can only attack fully susceptible varieties such as Bencubbin, Bungulla etc. Thus we have had a relatively wide choice of resistant varieties compared with other States.

In 1958 however a new race, identified as R.222-5 by Professor I. A. Watson, was recorded on sea wheat (Agropyron distichum) near Geraldton and also from a few wheat crops in this area. By 1959 this race had become very widespread as it was recorded from numerous wheat belt localities, often in association with R.126-1.

In March, 1960 yet another change occurred in the rust flora, when a rust attacking an out of season crop of Insignia 49 in the Borden area, was identified by Professor Watson as the Gabo attacking race 21-2. This race also appears to have spread very rapidly, for during September crops of Gabo were attacked for the first time in Western Australia, in the Geraldton region more than 400 miles north of Borden.

As some 33% of our total wheat acreage is planted to Gabo and it is easily our most popular variety, the economic importance of this Gabo attacking race in Western Australia can readily be appreciated. It is also of interest to note that the perennial grass A. distichum had been introduced from South Africa for stabilising coastal sand dunes, a purpose for which it is most suitable as it spreads widely by seed once it becomes established. However with the discovery that it is an efficient over-summering host of stem rust this grass has now been eradicated, as it was considered that it would be a menace to wheat crops if it became established along our western coast.

Because of the hot dry summer weather which generally prevails in Western Australia it is believed that perennial gasses rather than out of season annuals are largely responsible for the persistence of stem rust from season to season.

W.P CASS SMITH

Department of Agriculture,
PERTH.

CEREALS AND GRASSES

RECENT CHANGES IN THE RACES OF WHEAT STEM RUST IN WESTERN AUSTRALIA.

From about 1928 to 1958 only one race of wheat stem rust was identified from Western Australia, namely R.126-1 (- R.34) which can only attack fully susceptible varieties such as Bencubbin, Bungulla etc. Thus we have had a relatively wide choice of resistant varieties compared with other States.

In 1958 however a new race, identified as R.222-5 by Professor I. A. Watson, was recorded on sea wheat (*Agropyron distichum*) near Geraldton and also from a few wheat crops in this area. By 1959 this race had become very widespread as it was recorded from numerous wheat belt localities, often in association with R.126-1.

In March, 1960 yet another change occurred in the rust flora, when a rust attacking an out of season crop of Insignia 49 in the Borden area, was identified by Professor Watson as the Gabo attacking race 21-2. This race also appears to have spread very rapidly, for during September crops of Gabo were attacked for the first time in Western Australia, in the Geraldton region more than 400 miles north of Borden.

As some 39% of our total wheat acreage is planted to Gabo and it is easily our most popular variety, the economic importance of this Gabo attacking race in Western Australia can readily be appreciated. It is also of interest to note that the perennial grass *A. distichum* had been introduced from South Africa for stabilising coastal sand dunes, a purpose for which it is most suitable as it spreads widely by seed once it becomes established. However with the discovery that it is an efficient over-summering host of stem rust this grass has now been eradicated, as it was considered that it would be a menace to wheat crops if it became established along our western coast.

Because of the hot dry summer weather which generally prevails in Western Australia it is believed that perennial grasses rather than out of season annuals are largely responsible for the perpetuation of stem rust from season to season.

W. P. CASS SMITH

Department of Agriculture,
PERTH.

HELMINTHOSPORIUM AS AN OVARY PARASITE:

There are many known occurrences of Helminthosporium Spp. As parasites of the Gramineae causing either leaf spots or root rots. No record, however, has been found of any Helminthosporium infecting an ovary. Helminthosporium ravenelii Curtis has been recorded on species of Sporobolus, in different countries, causing a disease of the inflorescence known as False Smut or Sooty Head, but there is no information concerning the precise biological relations between Sporobolus and Helminthosporium ravenelii. Recent investigations into this relationship have shown that H. ravenelii is an ovary parasite of Sporobolus elongatus.

The extent of infection of the inflorescence is variable; some show only a few infected spikelets while others are almost completely covered by the matted mycelium and conidiophores of the fungus. Commonly, many spikelets in infected heads produce mature seeds. Examination of individual spikelets showed that in some cases the fungus envelops all parts of the spikelet, while in others it is confined to the ovary and is then seen only as a mass of conidiophores protruding from between the lemma and palea.

When individual spikelets were dissected and the various parts cleared, no mycelium was found in any organ except the ovary. Transverse sections showed that the fungus invades and destroys the whole ovary. The remains of the pericarp are distinuishable from those of the young seed, though both are invaded and replaced by dark brown pseudoparenchymatous fungal tissue consisting of closely - packed irregular-celled hyphae. It was found that in any infected spikelet the ovary is always destroyed and may be the only part affected. When other parts are affected, they are only enveloped and not invaded by the fungus.

There is some evidence that the invasion of the ovary follows the arrival of air-borne inoculum and is not the result of a systemic infection. Plants of Sporobolus elongatus with abundant development of H. ravenelii in the inflorescences were collected in the field, the inflorescences removed and the plants sprayed with copper oxychloride before being potted and transferred to a glasshouse. All inflorescences produced in the following twelve months were healthy.

Department of Botany,
University of Queensland,
BRISBANE.

D.G. PARBERY
and
R.F.N. LANGDON.

HELMINTHOSPORIUM AS AN OVARY PARASITE:

There are many known occurrences of Helminthosporium Spp. As parasites of the Gramineae causing either leaf spots or root rots. No record, however, has been found of any Helminthosporium infecting an ovary. Helminthosporium ravenelii Curtis has been recorded on species of Sporobolus in different countries, causing a disease of the inflorescence known as False Smut or Sooty Head, but there is no information concerning the precise biological relations between Sporobolus and Helminthosporium ravenelii. Recent investigations into this relationship have shown that H. ravenelii is an ovary parasite of Sporobolus elongatus.

The extent of infection of the inflorescence is variable; some show only a few infected spikelets while others are almost completely covered by the matted mycelium and conidiophores of the fungus. Commonly, many spikelets in infected heads produce mature seeds. Examination of individual spikelets showed that in some cases the fungus envelope all parts of the spikelet, while in others it is confined to the ovary and is then seen only as a mass of conidiophores protruding from between the lemma and palea.

When individual spikelets were dissected and the various parts cleared, no mycelium was found in any organ except the ovary. Transverse sections showed that the fungus invades and destroys the whole ovary. The remains of the pericarp are distinguishable from those of the young seed, though both are invaded and replaced by dark brown pseudoparenchymatous fungal tissue consisting of closely - packed irregular-celled hyphae. It was found that in any infected spikelet the ovary is always destroyed and may be the only part affected. When other parts are affected, they are only enveloped and not invaded by the fungus.

There is some evidence that the invasion of the ovary follows the arrival of air-borne inoculum and is not the result of a systemic infection. Plants of Sporobolus elongatus with abundant development of H. ravenelii in the inflorescences were collected in the field, the inflorescences removed and the plants sprayed with copper oxychloride before being potted and transferred to a glasshouse. All inflorescences produced in the following twelve months were healthy.

Department of Botany,
University of Queensland,
BRISBANE.

D.G. PARBERY
and
R.F.N. LANGDON.

MAIZE MOSAIC:

A virus disease causing chlorotic leaf stripes on maize cover crops in districts near Brisbane was prevalent last season and similar symptoms were noticed on sudan grass,. sorghum and row-planted maize.

Mechanical transmission of the disease was not obtained, but the leaf hopper Peregrinis maidis was used successfully as a vector from infected maize to sweet corn, maize, sorghum and sweet sudan grass. On this basis the virus concerned is probably maize mosaic (? stripe) (Carter, W., Ann. Ent. Soc. Amer. 34(3), 551, 1941: Storey, H.H., E. Afr. agric. J. 1, 336, 1936; Ibid, 471; Storey, H.H., Bot. Rev. 5, 253, 1939).

A great deal of variation occurred in severity of symptoms on plants of the same species infected from the one source. Interference with normal tasselling and head formation resulted and stunting was extreme in plants infected as young seedlings.

It is hoped to continue work on this virus in the present season.

R.S. GREBER.

Department of Agriculture and Stock,
BRISBANE.

MAIZE MOSAIC:

A virus disease causing chlorotic leaf stripe on maize cover crops in districts near Brisbane was prevalent last season and similar symptoms were noticed on sudan grass, sorghum and row-planted maize.

Mechanical transmission of the disease was not obtained, but the leaf hopper Peregrinia maidis was used successfully as a vector from infected maize to sweet corn, maize, sorghum and sweet sudan grass. On this basis the virus concerned is probably maize mosaic (? stripe) (Carter, W., Ann. Ent. Soc. Amer. 34(3), 551, 1941: Storey, H.H., E. Afr. agric. J. 1, 336, 1936; Ibid, 471; Storey, H.H., Bot. Rev. 5, 253, 1939).

A great deal of variation occurred in severity of symptoms on plants of the same species infected from the one source. Interference with normal tasselling and head formation resulted and stunting was extreme in plants infected as young seedlings.

It is hoped to continue work on this virus in the present season.

R.S. GREBER.

Department of Agriculture and Stock,
BRISBANE.

SORGHUM STALK-ROT IN NORTHERN TERRITORY:

During a visit to the Northern Territory in June, 1960, a trip was made to Katherine where some grain sorghum crops were inspected.

There was evidence of an upper stem rot to the extent of about 5% in some plots. The disease had caused a rot and collapse of the upper stem tissue above the upper node. The consipicuous symptom was the toppling of the heads at the upper node. No assessment was made of the grain yield of the affected heads, but it did appear that the heads were well filled. However a harvesting difficulty may arise from the incidence of the disease.

Colletotrichum graminicola was isolated from tissue immediately below the upper node of diseased plants.

J. R. MORSCHEL

Department of Health,
CANBERRA.

SORGHUM STALK-ROT IN NORTHERN TERRITORY:

During a visit to the Northern Territory in June, 1950, a trip was made to Katherine where some grain sorghum crops were inspected.

There was evidence of an upper stem rot to the extent of about 5% in some plots. The diseased had caused a rot and collapse of the upper stem tissue above the upper node. The conspicuous symptom was the toppling of the heads at the upper node. No assessment was made of the grain yield of the affected heads, but it did appear that the heads were well filled. However a harvesting difficulty may arise from the incidence of the disease.

Colletotrichum graminicola was isolated from tissue immediately below the upper node of diseased plants.

J. R. MORSCHEL.

Department of Health,
CANBERRA.

FIELD CROPS

THE PHYSICO-CHEMICAL BASIS OF RESISTANCE TO PERONSPORA TABACINA ADAM IN TOBACCO:

Mandryk & Cruickshank (in press) have demonstrated that an almost complete resistance to blue mould disease can be obtained in tobacco leaves by injecting spore suspensions of Peronospora tabacina Adam into the stems of plants.

A technique has been developed that allows the complete and reproducible germination of P. tabacina conidia in vitro. It has been demonstrated that following infection, either of leaves or stems, a substance that is strongly inhibitory to germination of the conidia of the same organism, is produced in the tobacco plant. In leaves, this substance can only be demonstrated in visibly infected areas, but in stem-infected plants it occurs in all leaves above the point of stem infection. No such substance can be demonstrated in uninfected plants. The germination inhibitor is produced following infection of blue mould susceptible varieties of Nicotiana tabacum Lind, N. umbratica Burbidge, N. tomentosa Ruiz & Pavon and N. cavicola Burbidge, but not in resistant varieties of N. cavicola Burbidge or in N. debneyi Domin.

The inhibitor may be extracted with ethyl ether from macerates of infected plants. The substance is stable to boiling and freezing and to physiologcal pH's, but is slowly decomposed at pH's below 3 and above 10. Paper chromatogaphy, using methyl ethyl ketone-water - diethylamine as the solvent (921 : 77 : 2) has demonstrated the presence of two distinct inhibitory compounds in extracts from infected leaves.

Using the leaf disc technique of Cruickshank & Muller, (Nature 180, 44, 1957), it has been shown that the mixture of substances is a potent inhibitor of sporulation. It has further been demonstrated that the substances gradually lose activity in the presence of healthy tobacco tissue.

It is suggested that the production of these compounds following stem infection and their distribution throughout the plant is the basis of the resistance of such plants to subsequent foliar infection. It is clear that the resistance of N. debneyi Domin and of the resistant varieties of N. cavicola Burbidge is based on a different mechanism.

Division of Plant Industry,
C.S.I.R.O.,
CANBERRA.

C. J. SHEPHERD
and
M. MANDRYK

VEGETABLES

WATERMELON MOSSSAIC VIRUS:

A mosaic disease of cucurbits in south-east Queensland often occurs as an almost complete infection of pumpkin crops and is also present to a variable extent on rockmelons, watermelons and squash.

This disease is now considered to be caused by a strain of watermelon mosaic (Grogan, R.G., Hall, D.H., and Kimble, K.A. Phytopathology 49(6), 366, 1959).

Mechanical transmission was obtained at moderate temperatures to many varieties of cucurbits including watermelon. No reaction occurred on Nicotiana glutinosa. Comparison of local lesion production on cowpea by this virus and cucumber mosaic virus strains from other sources has not yet given conclusive results, possibly due to temperature difficulties. Aphid transmission by Aphis gossypii, Macrosiphum euphorbiae and Myzus persicae was demonstrated in the glasshouse, with the first two species probably the important vectors in the field.

It is interesting to note that no typical C.M.V. was found among the many mosaic infected specimens of various species of cucurbits collected.

R.S. GREBER

Department of Agriculture and Stock,
BRISBANE.

FRUIT

STUNTING OF CITRUS TREES ON PONCIRUS TRIFOLIATA STOCK:

Citrus trees on Poncirus trifoliata stock are sometimes affected with a stunting condition which is not associated with manifestations of the scalybutt virus. Experiments to determine whether this stunting is transmissible have been in proress at the Gosford Citrus Experiment Station for the past five years and are now yielding positive results. Trees of a vigorous nucellar strain of navel orange were inoculated with buds from eight selections of variously stunted trees of Washington navel orange and Marsh gapefruit. During the past year the growth rates of inoculated trees have been depressed to varying degree depending on source of inoculum. The greatest effect has been obtained with inoculum of stunted Marsh grapefruit. Nucellar navel oranges inoculated with this selection are now about two-thirds the size of uninoculated controls and in addition are of poor colour and have suffered considerable defoliation. Not all stunting on trifoliata is due to a transmissible factor however, since inoculation with budwood of a very stunted Valencia orange has failed to induce stunting in nucellar navel orange trees, and trees propagated from this Valencia have grown well, with no signs of stunting. This type of stunting may possibly result from the accidental use of non-nucellar stocks, as is known to occur with sour orange stock.

L.R. FRASER

Department of Agriculture,
SYDNEY.

OBSERVATIONS ON SCALYBUTT VIRUS:

Cuttings of Carrizo citrange which were rooted in 1948 and subsequently budded in 1950 with scalybutt-free and scalybutt-affected buds of Washington navel orange have been under observation at Yanco Experiment Farm for the past 8 years. Trees of non-scalybutt origin on Carrizo stock are larger than trees of comparable age on Poncirus trifoliata selections. Scalybutt affected trees are only about half the size of the virus-free trees but are of healthy appearance, and no evidence of scaling is as yet evident on the Carrizo butts. Comparable trees on Poncirus trifoliata stock are much more reduced in size and the symptoms of scaling have been present for 4 years.

L.R. FRASER

Department of Agriculture,
SYDNEY.

TIP BLIGHT OF PASSIONFRUIT:

Tip blight is a severe disease of passionfruit occurring in isolated areas of central Queensland. It causes death of young seedlings of Passiflora edulis and terminal necrosis with subsequent stunting distortion and periodic necrosis in older vines. The normal woodiness fruit symptom is also present on the few fruit set by infected plants.

Glasshouse studies of transmission, cross-protection and host range have shown tip blight to be a strain of the Queensland woodiness virus. Aphis gossypii and Myzus persicae are efficient vectors, and the disease is also mechanncally transmissible.

The virus occurs widely on Passiflora suberosa, where it is tolerated with a mottle symptom only and this plant would appear to be a natural reservoir for the spread of the infection.

R.S. GREBER

Department of Agriculture and Stock,
BRISBANE.

TIP BLIGHT OF PASSIONFRUIT

Tip blight is a severe disease of passionfruit occurring in isolated areas of central Queensland. It causes death of young seedlings of Passiflora edulis and terminal necrosis with subsequent stunting distortion and periodic necrosis in older vines. The normal woodiness fruit symptom is also present on the few fruit set by infected plants.

Glasshouse studies of transmission, cross-protection and host range have shown tip blight to be a strain of the Queensland woodiness virus. Aphis gossypii and Myzus persicae are efficient vectors, and the disease is also mechanically transmissible.

The virus occurs widely on Passiflora suberosa, where it is tolerated with a mottle symptom only and this plant would appear to be a natural reservoir for the spread of the infection.

R.S. GREBER

Department of Agriculture and Stock,
BRISBANE.

ORNAMENTALS

AZALEA PETAL BLIGHT:

This disease, which was recorded on azaleas and rhododendrons for the first time in N.S.W. last year, has again made its appearance following rain and periods of high humidity during early September. Serious damage has been caused only in isolated instances and, fortunately, its severity has nowhere approached that attributed to it in the south-eastern United States, where spraying at 2-day intervals is necessary to protect the blossoms.

The apothecial stage has not been seen either in the field or on sclerotia brought into the laboratory and gasshouse and kept on moist sand after overwintering outdoors. However, because of the characteristic conidia, sclerotia and symptoms, there can be little doubt that the causal fungus is Ovulinia azaleae.

Observations in gardens and nurseries indicate that there are considerable differences in susceptibility between varieties.

There is no mention in the literature of infection of any tissue other than the corolla. However, in the case of one variety here at least, Christmas Pink, the fungus has been isolated from surface sterilised sepals and pedicels as well, but not from bud scales or from the projecting stubs where the pedicels join the branches.

The information obtained from these plating tests agrees with that obtained from keeping the various plant parts separately in a humid atmosphere for several days. Although the fungus has not yet been observed to spore on parts other than the corolla, sclerotia have developed on sepals and pedicels.

Although no infection tests have been carried out, these observations, together with the observed collapse of sepals and pedicels on a plant of Christmas Pink, suggest that these had actually become infected.

The presence of the fungus in the pedicel and calyx of this variety at least and the habit of many of the newer azaleas of blooming intermittently throughout the autumn and winter suggest that, should this disease warrant further investigation in Australia, a study of the method of carryover from season to season might prove helpful.

P.G. VALDER

Department of Agriculture,
SYDNEY.

ORNAMENTALS

AZALEA PETAL BLIGHT:

This disease, which was recorded on azaleas and rhododendrons for the first time in N.S.W. last year, has again made its appearance following rain and periods of high humidity during early September. Serious damage has been caused only in isolated instances and, fortunately, its severity has nowhere approached that attributed to it in the southeastern United States, where spraying at 2-day intervals is necessary to protect the blossoms.

The apothecial stage has not been seen either in the field or on sclerotia brought into the laboratory and grasshouse and kept on moist sand after overwintering outdoors. However, because of the characteristic conidia, sclerotia and symptoms, there can be little doubt that the causal fungus is Ovulinia azaleae.

Observations in gardens and nurseries indicate that there are considerable differences in susceptibility between varieties.

There is no mention in the literature of infection of any tissue other than the corolla. However, in the case of one variety here at least, Christmas Pink, the fungus has been isolated from surface sterilised sepals and pedicels as well, but not from bud scales or from the projecting stubs where the pedicels join the branches.

The information obtained from these plating tests agrees with that obtained from keeping the various plant parts separately in a humid atmosphere for several days. Although the fungus has not yet been observed to spore on parts other than the corolla, sclerotia have developed on sepals and pedicels.

Although no infection tests have been carried out, these observations, together with the observed collapse of sepals and pedicels on a plant of Christmas Pink, suggest that these had actually become infected.

The presence of the fungus in the pedicel and calyx of this variety at least and the habit of many of the newer azaleas of blooming intermittently throughout the autumn and winter suggest that, should this disease warrant further investigation in Australia, a study of the method of carryover from season to season might prove helpful.

P.G. VALDER

Department of Agriculture,
SYDNEY.